



Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640
Fax: +86-755-26648637
Website: www.cqa-cert.com

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RF Exposure Evaluation Report

Report No.: CQASZ20210200111E-02
Applicant: GuangDong Substanbo Technology Co., Ltd.
Address of Applicant: 2508, Building 4, Tianan Cloud Park Phase II, Bantian Street, Longgang District, Shenzhen, China 518100
Equipment Under Test (EUT):
EUT Name: 2.0CH SOUNDBAR SYSTEM
Model No.: Odine IV, Odine xx(xx stands for letter or number,xx canbe the letters A-Z, or the number 0-9)
Test Model No.: Odine IV
Brand Name: bomaker
FCC ID: 2AS9D-ODINES
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1091
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2021-02-02
Date of Test: 2021-02-02 to 2021-03-10
Date of Issue: 2021-03-10
Test Result: **PASS***

*In the configuration tested, the EUT complied with the standards specified above

Tested By: Martin Lee
(Martin Lee)
Reviewed By: Ares Liu
(Ares Liu)
Approved By: Sheek Luo
(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210200111E-02	Rev.01	Initial report	2021-03-10

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3 General Information

3.1 Client Information

Applicant:	GuangDong Substanbo Technology Co., Ltd.
Address of Applicant:	2508, Building 4, Tianan Cloud Park Phase II, Bantian Street, Longgang District, Shenzhen, China 518100
Manufacturer:	GuangDong Substanbo Technology Co., Ltd.
Address of Manufacturer:	2508, Building 4, Tianan Cloud Park Phase II, Bantian Street, Longgang District, Shenzhen, China 518100
Factory:	SHENZHEN MENGXIANG TECHNOLOGY CO.,LTD.
Address of Factory:	Shenzhen New District of Longhua City,Dalang street,Tong Fu village industrial zone,16 building 3floor

3.2 General Description of EUT

Product Name:	2.0CH SOUNDBAR SYSTEM
Model No.:	Odine IV, Odine xx(xx stands for letter or number,xx canbe the letters A-Z, or the number 0-9)
Test Model No.:	Odine IV
Trade Mark:	bomaker
Hardware Version:	V1.0
Software Version:	V5.0
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Test Software of EUT:	MV FrequencyTools v0.2.8 (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	3.38dBi
Power Supply:	Adapter: MODEL NO.: CW1802330US INPUT: 100-240V~50/60Hz 1.2A MAX OUTPUT: 18V 2.33A

Model No.: Odine IV, Odine xx(xx stands for letter or number,xx canbe the letters A-Z, or the number 0-9)

Only the model Odine IV was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

Antenna Gain: 3.38dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.18 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-2.220	-3.0±1	-2.0	0.631
Middle(2441MHz)	-1.760	-2.5±1	-1.5	0.708
Highest(2480MHz)	-1.980	-2.5±1	-1.5	0.708
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-2.270	-3.0±1	-2.0	0.631
Middle(2441MHz)	-1.770	-2.5±1	-1.5	0.708
Highest(2480MHz)	-2.060	-3.0±1	-2.0	0.631
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-2.240	-3.0±1	-2.0	0.631
Middle(2441MHz)	-1.930	-2.5±1	-1.5	0.708
Highest(2480MHz)	-2.080	-3.0±1	-2.0	0.631

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
0.708	3.38	0.00031	1.0	PASS

Note: 1) Refer to report No. CQASZ20210200111E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (0.708 * 2.18) / (4 * 3.1416 * 20^2) = 0.00031$